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IS 1448-5 (1970): Methods of test for petroleum and its products, Part 5: Burning quality [PCD 1: Methods of Measurement and Test for Petroleum, Petroleum Products and Lubricants]

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IS : 1448 [P : 5] - 1970
(Reaffirmed 2003)

BURNING QUALITY

[P : 5]

(First Revision)

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(Incorporating Amendment No. 1)

UDC 662.753.22 : 536.468

Adapted from the Institute of Petroleum Standards No. IP 10/65 and IP 11/63T

[In this revision, precision limits in Method A have been changed. The Method B prescribes the use of a different type of lamp and has been completely rewritten accordingly.]

1. SCOPE

1.1 The method (Method A) prescribed is intended to evaluate the burning properties of kerosine that may be used as an illuminant and as a fuel for space heaters, cookers, incubators, etc.

1.2 This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. METHOD A

2.1 Outline of the Method — The kerosine is burned for 24 hours in a specified lamp, the flame conforming to a specified size and shape. At the end of the test period, the consumption of kerosine and the amount of char formed on the wick are measured, and a qualitative assessment is made of the appearance of the glass chimney.

2.2 Apparatus

2.2.1 *Lamp* — conforming essentially to the shape and dimensions shown in Fig. 1. The tolerance wherever not specified on the dimensions of the chimney except on the glass shall be ±1 mm. It is essential to ensure

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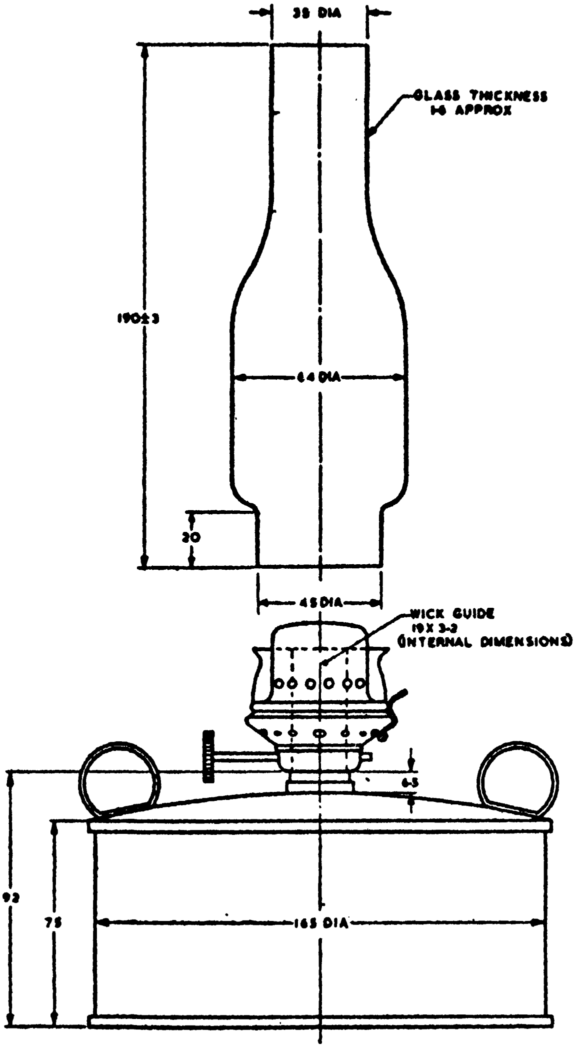
that the burner fits vertically into the oil reservoir, and that the wick-guide has parallel sides and is centrally disposed in relation to the slot in the dome of the burner. Any distortion of the wick-guide or dome makes the production of the necessary flame shape difficult and renders subsequent char values unreliable.


38 DIA
GLASS THICKNESS 1·6 APPROX
190±3
64 DIA
20
45 DIA
WICK GUIDE 19 X 3·2 (INTERNAL DIMENSIONS)
6·5
92
75
165 DIA

All dimensions in millimetres.

FIG. 1 LAMP

2.2.2 *Wick* — 19-mm paraffin flat wick containing approximately 43 ends of three-ply yarn, woven double plain weave with stitching ends, one blue stripe on one face and one green stripe on the reverse face, woven with approximately 6 picks/cm and weighing 15 g/m. After weaving, the wick shall be boiled in distilled water and dried thoroughly. The wick shall then be made into rolls and left for seven days before it is cut into 20-cm lengths. The lengths shall then be packed into suitable containers. The ash content of the wick shall not exceed 0·4 percent.

2.3 Reagents

2.3.1 *Denatured Spirit* — *See* IS : 324-1959*.

2.3.2 *Petroleum Hydrocarbon Solvent* — Grade 60/80 of IS : 1745-1966†.

2.4 Preparation of the Apparatus

2.4.1 Clean the lamp burner thoroughly, removing completely the deposit from the wick-guide, air holes and ducts. Drain the oil reservoir completely of the previous sample.

2.4.2 Soak new chimneys in dilute hydrochloric acid (approximately 6 N) for 24 hours, clean them with a brush and rinse them with distilled water. Then subject them to three preliminary 24 hours burning periods. Clean all chimneys with soap and water, rinse them thoroughly with distilled water, and dry them before each test.

2.4.3 Put a number of wicks into a well-lagged Soxhlet apparatus in such a manner as to prevent distortion and extract them with boiling water for 3 hours from the end of the first siphoning cycle. Remove the wicks from the apparatus, lay them flat between sheets of filter paper and press them gently to remove excess moisture. Extract them with denatured spirit for 3 hours in an unlagged Soxhlet apparatus, drain the denatured spirit as completely as possible from the extractor and continue the extraction with petroleum hydrocarbon solvent for one hour.

2.5 Procedure

2.5.0 Make the test in a well-ventilated room. If necessary, surround the lamp by a screen of about 60 cm diameter and of sufficient height to protect it from all draughts. Ensure that the minimum temperature of the room and of the oil in the reservoir at the start of and during the test is 15·5°C. Place the lamps so that they are at least 30 cm from any wall or other lamp.

2.5.1 Dry the wick in an oven at 105°C for one hour, soak it while it is still hot in the sample and fit it into the wick-guide. Rinse out the

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*Specification for ordinary denatured spirit (*revised*).

†Specification for petroleum hydrocarbon solvents (*first revision*).

reservoir two or three times with the sample. Filter the sample through a coarse-texture filter paper (such as Whatman No. 4) to remove suspended matter, pour 900 ml into the reservoir and assemble the lamp.

2.5.2 Hinge back the dome and chimney and trim the wick carefully with sharp scissors to produce a smooth and symmetrical flame of the dimensions shown in Fig. 2. Trim the wick as follows:

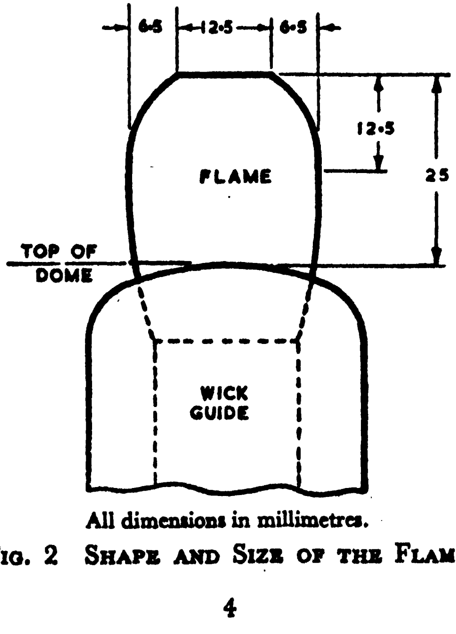
a) Cut the wick level with the wick-guide;
b) Raise the wick and cut off a triangular portion from each corner and round off the sharp corners slightly, as shown in the ' front view ' in Fig. 3; and
c) Remove any ragged projections from the top edges of the wick by bevelling them slightly as shown in the ' side view ' in Fig. 3.

2.5.3 Resaturate the wick with the sample and weigh the lamp. Light the lamp and adjust the flame to within 1·5 mm of the standard flame dimensions.

NOTE — The measurements of the flame may be made with any suitable gauge capable of measuring vertical and horizontal dimensions with sufficient accuracy. The gauge should be placed about 15 cm from the flame.

2.5.4 Allow the lamp to burn for one hour and then readjust the flame, if necessary, to the standard height.

2.5.5 Allow the lamp to burn for a further 23 hours without adjustment of any kind. At the end of this period, extinguish the flame and weigh the lamp. The consumption of kerosine during the test is about 20 g/h.



All dimensions in millimetres.

FIG. 2 SHAPE AND SIZE OF THE FLAME

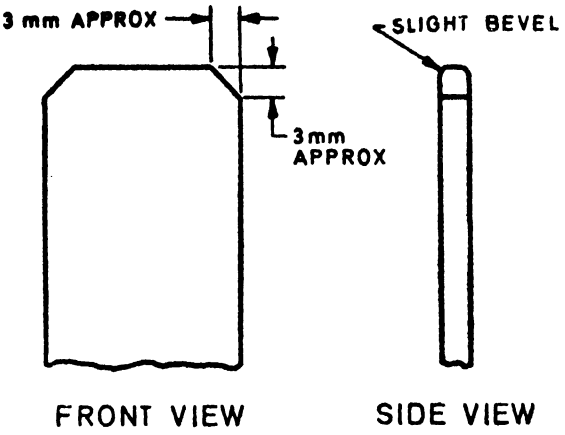


FIG. 3 VIEWS OF WICK

2.5.6 Turn up the wick and cut off approximately 13 mm of the charred end. Place this short length of wick, together with any pieces of char which have become detached in a small beaker, remove any char adhering to the wick-guide by gentle scraping with metal forceps and add it to the beaker. Wash the contents of the beaker free of kerosine by decantation with petroleum hydrocarbon, and dry them in an oven at 105°C for 30 minutes. Remove the char completely from the wick by breaking its structure and by scraping gently along and across the wick with the points of metal forceps. Transfer the mixture of char and fibre to a glass plate, remove any pieces of thread, and pick out coarse char and place it on a tared watch-glass. Remove the fine, fluffy fibre as completely as possible from the mixture by tapping it from one glass plate to another, and by collecting the fibre on a short stiff-bristled brush without removing the char. Finally, brush the remaining mixture of fine char and inseparable fibre on to the watch-glass. Weigh the watch-glass.

2.5.7 Note the appearance and colour of the bloom on the chimney.

2.6 Calculation and Reporting — Calculate and report the following results:

a) Total consumption of sample in grams.
b) Average consumption of sample in grams per hour.
c) Weight of dry char in milligrams per kilogram of sample.
d) Bloom on Chimney:
    1) Predominating colour — brown, greyish brown or grey,
    2) General appearance — normal or abnormal.
e) The maximum and minimum temperature of the test room.
f) Atmospheric conditions — humid, foggy, etc.

2.7 Precision — Results of duplicate tests shall not differ by more than the following amounts:

Char Value	*Repeatability*	*Reproducibility*
0 to 30 mg/kg	$0{\cdot}91\sqrt{A}$	$2{\cdot}9\sqrt{A}$

where

A = mean of two test results.

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